Commercial IECC 2021 MA amendments – DOER draft 6-28-21

Red underline and ~~black strike-out~~ designates existing MA amendments in the 9th edition IECC2018 proposed to continue with the 10th edition IECC2021.

~~Red strike-out~~ designates MA amendments in the 9th edition IECC2018, removed for the 10th edition IECC2021.

Blue underline and ~~Blue strike-out~~ designates changes to MA amendments (new or revised amendments) to the 10th edition IECC2021.

List of new amendments:

a) Allow Stretch code and IECC2021 Zero energy appendices – as optional compliance paths
b) Remove MA source energy ASHRAE performance option – revert to existing site energy approach
c) Modify envelope backstop to allow use of Vertical UA calculation and change formula
d) Reduce Commercial fenestration u-values closer to Residential levels
e) Modify Commercial EV ready wiring to 10% of spaces, with exceptions
f) C406 shifts from 3 options out of 10 choices to 15 points from the C406 table of options (IECC2021 is 10 points)
g) Max. HERS rating option update from 55 to 52
h) PHIUS option updated from 2018 to 2021

CHAPTER 1 [CE]
SCOPE AND ADMINISTRATION

SECTION C103
CONSTRUCTION DOCUMENTS

Add the following to Section C103.2:

C103.2 Information on construction documents.

14. Solar Ready roof zone in accordance with Appendix CA.

15. EV Ready Spaces locations in accordance with C405.10

Add the following Section C103.2.2:

C103.2.2 COMcheck submittal.

The construction documents submitted with the application for permit shall be accompanied by completed COMcheck Envelope, Lighting and Mechanical Compliance Certificates, and a Plan Review Inspection Checklist for the purposes of demonstrating compliance with the energy provisions of 780 CMR 13.00: *Energy Efficiency*.

CHAPTER 2 [CE]

DEFINITIONS

Add the following definitions:

ELECTRIC VEHICLE. An automotive-type vehicle for on-road use, such as passenger automobiles, buses, trucks, vans, neighborhood electric vehicles, electric motorcycles, and the like, primarily powered by an electric motor that draws current from a rechargeable storage battery, fuel cell, photovoltaic array, or other source of electric current.

Informational note: defined as in 527 CMR 12 section 625.2.

ELECTRIC VEHICLE SUPPLY EQUIPMENT (EVSE): The conductors, including the ungrounded, grounded, and equipment grounding conductors, and the *Electric Vehicle* connectors, attachment plugs, and all other fittings, devices, power outlets, or apparatus installed specifically for the purpose of transferring energy between the premises wiring and the *Electric Vehicle*.

Informational note: defined as in 527 CMR 12 section 625.2.

ELECTRIC VEHICLE CHARGING SPACE ("EV READY SPACE"). A designated parking space which is provided with one dedicated 50-ampere branch circuit for *EVSE* servicing *Electric Vehicles*.

CHAPTER 3 [CE]
GENERAL REQUIREMENTS

SECTION C301
CLIMATE ZONES

C301.1 General. Massachusetts is in *climate zone* 5A
~~*Climate zones* from Figure C301.1 or Table C301.1 shall be used for determining the applicable requirements from Chapter 4. Locations not indicated in Table C301.1 shall be assigned a *climate zone* in accordance with Section C301.3.~~

~~**C301.2 Warm Humid counties.** In Table C301.1, Warm Humid counties are identified by an asterisk.~~

~~**TABLE C301.1**~~
~~**CLIMATE ZONES, MOISTURE REGIMES, AND WARM HUMID DESIGNATIONS BY STATE, COUNTY AND TERRITORYa**~~

CHAPTER 4 [CE]
COMMERCIAL ENERGY EFFICIENCY

SECTION C401
GENERAL

Revise Section C401.2 as follows:

C401.2 Application. Commercial buildings shall comply with Section C401.2.1, ~~or~~ C401.2.2, C401.2.3 or C401.2.4

C401.2.1 International Energy Conservation Code.
Commercial buildings shall comply with one of the following:

1. Prescriptive Compliance. The Prescriptive Compliance option requires compliance with Sections C402 through C406 and Section C408.
   Dwelling units and sleeping units in Group R-2 buildings without systems serving multiple units shall be deemed to be in compliance with this chapter, provided that they comply with Section R406.
2. Total Building Performance. The Total Building Performance option requires compliance with Section C407.

Exception: Additions, alterations, repairs and changes of occupancy to existing buildings complying with Chapter 5.

C401.2.2 ASHRAE 90.1. Commercial buildings shall comply with the requirements of ANSI/ASHRAE/IESNA 90.1. as modified by C402.1.5, C402.3, C405.3, C405.4, C405.13 and C406.

~~a. If following Appendix G then use ANSI/ASHRAE/IESNA 90.1-2016 as modified by Massachusetts amended sections: C401.2, C402.1.5, C402.3, C405.3, C405.4, C405.9 and C406.~~

~~b. If following Stretch energy code Section AA103.2 then use ANSI/ASHRAE/IESNA 90.1-2013 Appendix G as modified by Massachusetts amended sections: C401.2, C402.1.5, C402.3, C405.3, C405.4, C405.9 and C406.~~

Add the following row to ASHRAE 90.1 Normative Appendix G Performance Rating Method, Section G Table G3.1.1-1.

TABLE G3.1.1-1 BASELINE BUILDINGS VERTICAL FENESTRATION PERCENTAGE OF GROSS ABOVE-GRADE-WALL AREA

Building Area Types	Baseline Building Gross Above-Grade-Wall Area
Multifamily	24%

C401.2.3 APPENDIX CC. Commercial buildings may elect to comply with the requirements of IECC Appendix CC - ZERO ENERGY COMMERCIAL BUILDING PROVISIONS

C401.2.4 MA Stretch energy code. Commercial buildings may elect to comply with the requirements of CMR 225 – MASSACHUSETTS STRETCH ENERGY CODE, or, the MUNICIPAL OPT-IN SPECIALIZED STRETCH ENERGY CODE promulgated by the Massachusetts Department of Energy Resources.

C401.2.2 Performance rating method for source energy. ANSI/ASHRAE/IESNA 90.1 APPENDIX G PERFORMANCE RATING METHOD, Section G1.1

Exception:
When Appendix G is used for the comparison of building energy consumption only, the comparison may be performed on site energy ~~and/or on a source energy~~ basis.

~~**C401.2.2.1 Source energy method.** For the purpose of quantifying the projected Source Energy consumption of a building the Site to Source Fuel Conversion factors in Table 401.2.2 shall apply.~~

~~**TABLE C401.2.2 SITE TO SOURCE FUEL CONVERSION FACTORS**~~

~~Load Type~~	~~Factor~~
~~Electricity (Grid Purchase)~~	~~2.80~~
~~Electricity (On-Site Solar or Wind)~~	~~1.00~~
~~Natural Gas~~	~~1.05~~
~~Fuel Oil~~	~~1.01~~
~~LPG Propane & Liquid Propane~~	~~1.01~~
~~Purchased District Heating~~ ~~Hot Water~~ ~~Steam~~	 ~~1.20~~ ~~1.20~~
~~Purchased District Cooling~~	~~0.91~~
~~Fossil fuels not listed~~	~~1.1~~
~~Purchased Combined Heat and Power District Heat~~	~~*~~

~~*A source fuel conversion for purchased district heat supplied by a combined heat and power central utility will be published by the MA Dept. of Energy Resources on a per district system basis.~~

~~**C401.2.3 Approved software for source energy calculation with combined heat and power.**~~

1. ~~Determination of the source energy consumption and usage intensity when using purchased combined heat and power district heat shall be performed as an exceptional calculation using the Department of Energy Resources (DOER) approved Excel worksheet.~~
2. ~~Determination of the source energy consumption and usage intensity for heat generated by a combined heat and power system located on-site shall be performed using software meeting the requirements of ASHRAE 90.1 Normative Appendix G-Performance-Rating Method, Section G 2.2 Simulation Program, and has an explicitly stated capability to determine both the site and source energy use intensity for combined heat and power systems without the requirement for exceptional calculations as defined in ASHRAE 90.1 Appendix G Section G2.5.~~

C402.1.5 Component performance alternative. Building envelope values and fenestration areas determined in accordance with Equation 4-2 shall be an alternative to compliance with the *U*-, *F*- and *C*-factors in Tables C402.1.4 and C402.4 and the maximum allowable fenestration areas in Section C402.4.1. *Fenestration* shall meet the applicable SHGC requirements of Section C402.4.3. Buildings following ANSI/ASHRAE/IESNA 90.1~~-2013 Appendix G or 90.1-2016 Appendix G~~ shall comply with this section.

Exception: Buildings demonstrating a vertical UA equal or lower than a prescriptive UA calculated in accordance with TABLE C402.1.4

A + B + C~~+ D + E~~ ≤ Zero **(Equation 4-2)**
where**:**
A = Sum of the (UA Dif) values for each distinct assembly type of the *building thermal envelope*, other than slabs on grade and below-grade walls.
UA Dif = UA Proposed – UA Table.
UA Proposed = Proposed *U*-value × Area Proposed.
UA Table = (*U*-factor from Table C402.1.3, C402.1.4 or C402.4) × vertical fenestration Area baseline.
B = Sum of the (FL Dif) values for each distinct slab-on-grade perimeter condition of the *building thermal envelope.*
FL Dif = FL Proposed – FL Table.
FL Proposed = Proposed F-value × Perimeter length.
FL Table = (F-factor specified in Table C402.1.4) × Perimeter length.
C = Sum of the (CA Dif) values for each distinct below-grade wall assembly type of the building thermal envelope.
CA Dif = CA Proposed – CA Table.
CA Proposed = Proposed C-value × Area.
CA Table = (Maximum allowable C-factor specified in Table C402.1.4) × Area.

Delete the exception in Section C402.2.4.1:

C402.2.4.1 Insulation installation.

~~**Exception:** Where the slab-on-grade floor is greater than 24 inches (61 mm) below the finished exterior grade, perimeter insulation is not required.~~

C402.3 Rooftop solar readiness (Mandatory).
Follow Appendix CB~~A~~: Solar-ready zone – Commercial.
~~**Roof solar reflectance and thermal emittance.**~~
~~Low-sloped roofs directly above cooled conditioned spaces in *Climate Zones* 0 through 3 shall comply with one or more of the options in Table C402.3.~~

Modify Vertical fenestration U-factors in TABLE C402.4:

TABLE C402.4
BUILDING ENVELOPE FENESTRATION MAXIMUM *U*-FACTOR AND SHGC REQUIREMENTS

Vertical fenestration *U*-factor	
Fixed fenestration	~~0.36~~ 0.30
Operable fenestration	~~0.45~~ 0.32

C402.6 Approved calculation software tools. The following software tools are sufficient to demonstrate compliance with Section C401.2.1 Prescriptive Compliance. ~~prescriptive options 1 (ASHRAE 90.1) or 2 (IECC2018):~~

1. ~~COMcheck:~~ COMcheck-Web ~~or COMcheck for Windows Version 4.1.4 or later,~~ available at: https://www.energycodes.gov/comcheck

~~Note: Software tools approved to demonstrate compliance with Section 401.2 option 3 Performance certification methods are listed in Section C407.4.~~

SECTION C403
BUILDING MECHANICAL SYSTEMS

SECTION C404
SERVICE WATER HEATING

SECTION C405
ELECTRICAL POWER AND LIGHTING SYSTEMS

C405.2.4 Daylight-responsive controls. *Daylight responsive controls* complying with Section C405.2.4.1 shall be provided to control the general lighting within *daylight zones* in the following spaces:

1. Spaces with a total of more than ~~150~~100 watts of *general lighting* within primary sidelit daylight zones complying with Section C405.2.4.2.
2. Spaces with a total of more than 300 watts of *general lighting* within sidelit daylight zones complying with Section C405.2.4.2.
3. Spaces with a total of more than ~~150~~100 watts of *general lighting* within toplit daylight zones complying with Section C405.2.4.3.

C405.13~~0~~ Electric Vehicle Charging Spaces ("EV Ready Spaces") (Mandatory). Group A-1, B, E, I, M and R buildings with ~~fifteen or more~~ passenger vehicle parking spaces shall provide *EV Ready Spaces* in accordance with Table C405.13.

Table C405.13

# of Parking Spaces	Minimum # of EV Ready Spaces
1	0
2-6	1
7-13	2
14-20	3
21-40	4
41+	10% but not more than 16 spaces

The branch circuit shall be identified as "EV READY" in the service panel or subpanel directory, and the termination location shall be marked as "EV READY". The circuit

shall terminate in a NEMA receptacle or a Society of Automotive Engineers (SAE) standard J1772 electrical connector.

Exceptions:

1. Parking spaces and garage spaces intended exclusively for storage of vehicles for retail sale or vehicle service.
2. This requirement will be considered met if all spaces which are not EV Ready are separated from the meter by a public right-of-way.
3. Any 50-ampere branch circuit may be replaced by 3 or more "EV READY" labelled 20-ampere branch circuits and terminations where additional spaces are available.
4. Any parking facility with a hydrogen fuel cell vehicle refueling station or with 2 or more spaces providing Level 3 Direct Current EVSE

SECTION C406
ADDITIONAL EFFICIENCY REQUIREMENTS (Note revised format in IECC2021 to a points table, so needs extensive formatting revisions to replicate existing MA amendments)
C406.1 Additional energy efficiency credit requirements.
New buildings shall achieve a total of 150 credits from Tables C406.1(1) through C406.1(5) where the table is selected based on the use group of the building and from credit calculations as specified in relevant subsections of Section C406.
Where a building contains multiple-use groups, credits from each use group shall be weighted by floor area of each group to determine the weighted average building credit. Credits from the tables or calculation shall be achieved where a building complies with one or more of the following:
1. More efficient HVAC performance in accordance with Section C406.2.
2. Reduced lighting power in accordance with Section C406.3.
3. Enhanced lighting controls in accordance with Section C406.4.
4. On-site supply of renewable energy in accordance with Section C406.5.
5. Provision of a dedicated outdoor air system for certain HVAC equipment in accordance with Section C406.6.
6. High-efficiency service water heating in accordance with Section C406.7.
7. Enhanced envelope performance in accordance with Section C406.8.
8. Reduced air infiltration in accordance with Section C406.9
9. Where not required by Section C405.12, include an energy monitoring system in accordance with Section C406.10.
10. Where not required by Section C403.2.3, include a fault detection and diagnostics (FDD) system in accordance with Section C406.11.
11. Efficient kitchen equipment in accordance with Section C406.12.
12. ~~9.~~Renewable space heating in accordance with Section C406.13~~0~~.

13. ~~10.~~*Type IV* heavy timber construction in accordance with Section C406.14~~1~~

C406.13~~10~~ Renewable space heating. All space heating shall be provided with cold-climate air source heat pumps having rated coefficient of performance (COP) of at least 1.75 at 5 degrees Fahrenheit source air. (10 points)

C406.1411 Heavy Timber construction. In buildings with 4 stories or more of *Type IV* heavy timber construction either above grade, or above a podium. (8 points)

SECTION C407
TOTAL BUILDING PERFORMANCE

SECTION C407
TOTAL BUILDING PERFORMANCE CERTIFICATION METHODS

C407.1 Scope. The following sections C407.1.1 or C407.1.2 are approved performance certification methods to demonstrate compliance without calculation of a standard reference design.

Exception: Energy used to recharge or refuel vehicles that are used for on-road and off-site transportation purposes, or energy losses from use of behind-the-meter energy storage, should not be included in determining building performance.

C407.1.1 Energy Rating HERS Index (ERIHERS) for multi-family buildings. For residential units within a building up to 5 stories above grade plane, a HERS rater verified Energy RatingHERS Index (HERSERI) score of 525 or less for each finished unit, together with a completed and HERS rater verified set of ENERGY STAR Multifamily New Construction (MFNC) program, Thermal Enclosure System Rater Checklists may be used.

C407.1.2 Passive House Institute US (PHIUS) or Passive House Institute (PHI) certification. Projects precertified through PHIUS or PHI, with a certified Passive House Consultant or certified Passive House Designer verified "as-built" report demonstrating compliance with the PHIUS or PHI standard.

C407.2 Mandatory requirements.
Compliance with this section requires compliance with Sections C402.3 and C405.

C407.3 HERSERI **based compliance.** Compliance based on an HERSERI analysis requires that the *rated design* be shown to have an HERS IndexERI less than or equal to 525 when compared to the HERSERI *reference design* prior to credit for onsite renewable electric generation. The Home Energy Rating Index (HERSERI) shall be determined in accordance with RESNET/ICC standard 301., the ERI Reference Design Ventilation rate shall be in accordance with Equation 4-1.

~~**(Equation 4-1)** Ventilation rate, CFM = (0.01 x total square foot area of dwelling unit) + [7.5 x (number of bedrooms + 1)]~~

C407.4 Compliance software tools. Software tools used for determining ERI shall be Approved Software Rating Tools in accordance with RESNET/ICC 301. Where calculations require input values not specified by Sections R402, R403, R404 and R405, those input values shall be taken from RESNET/ ICC 301. Software tools for determining Passive House certification shall be approved software tools by PHIUS or PHI.

C407.5 Documentation. Documentation verifying that the methods and accuracy of compliance software tools conform to the provisions of this section shall be provided to the *building official, in accordance with Sections C407.5.1 through C407.5.2*

C407.5.1 HERS~~ERI~~ **Documentation.** Prior to the issuance if a building permit, the following items must be provided to the Building Official:

1. A HERS compliance report which includes a proposed HERS index score of 55~~5~~2 or lower;
2. A description of the unit's energy features;
3. A statement that the rating index score is "based on plans".

Prior to the issuance of a certificate of occupancy, the following items must be provided to the Building official:

4. A copy of the final certificate indicating that the HERS rating index score for each unit is verified to be 55~~5~~2 or less;
5. A completed HERS rater verified ENERGY STAR Thermal Enclosure System Rater Checklist.

C407.5.2 Passive House Documentation. If using PHIUS or PHI Passive House software, prior to the issuance of a building permit, the following items must be provided to the Building Official:

1. A WUFI or PHPP compliance report which demonstrates project compliance with PHIUS~~2018~~ CORE 2021 (or newer) or PHI performance requirements;
2. A statement that the WUFI or PHPP results are "based on plans";
3. Evidence of precertification approval from PHIUS or PHI.

Prior to the issuance of a certificate of occupancy, the following item(s) must be provided to the building official:

4. An updated WUFI or PHPP compliance report which demonstrates project compliance with PHIUS~~2018~~CORE 2021 (or newer) or PHI performance requirements;
5. A copy of the Passive House Rater's test results;

6. A statement that the WUFI or PHPP results are “based on ‘as-built’ conditions, incorporating the relevant test results and documented changes to equipment, materials, and assemblies that impact performance”.

C407.6 Verification by approved agency. Verification of compliance with Section C407 shall be completed by an *approved* third party. For compliance using an ERI certification, verification of compliance shall be completed by the certified HERS rater. For compliance using PHIUS or PHI, verification of compliance shall be completed by a certified Passive House consultant.

CHAPTER 5 [CE]
EXISTING BUILDINGS

SECTION C503
ALTERATIONS

C503.1 General.
Alterations to any *building* or structure shall comply with the requirements of Section C503, and Sections C402, C403, C404, C405 of the code for new construction. *Alterations* shall be such that the existing *building* or structure is not less conforming to the provisions of this code than the *existing building* or structure was prior to the *alteration*. *Alterations* to an existing *building*, *building* system or portion thereof shall conform to the provisions of this code as those provisions relate to new construction without requiring the unaltered portions of the existing *building* or *building* system to comply with this code. *Alterations* shall not create an unsafe or hazardous condition or overload existing *building* systems.

Alterations complying with ANSI/ASHRAE/IESNA 90.1 need not comply with Sections C402, C403, and C404 ~~and C405~~.